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Submitted via www.regulations.gov (Docket No. FWS-R6-ES-2023-0216)

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Re: Public comment on interim 4(d) rule for wolverine

Dear Director Williams:

The Western Environmental Law Center ("WELC") commends the U.S. Fish and Wildlife Service ("the Service") for applying the best available science and listing a distinct population segment ("DPS") of the North American wolverine (*Gulo gulo luscus*) occurring in the lower 48 States (hereinafter "wolverine") as a threatened species. This is an important and much needed first step to conserving the species and we look forward to participating in future efforts to develop a recovery plan and designate critical habitat. That said, concerns remain over the proposed interim 4(d) rule outlined in the final listing rule.

In response, WELC submits the following comments on behalf of plaintiffs in *WildEarth Guardians et al. v. Williams et al.*, 20-cv-00181-DWM (D. Mont. 2021) and additional organizations that have joined these comments (a list is provided). These comments supplement and do not replace other comments that have already been submitted or will be submitted by these respective organizations or individual members of them.

For threatened species, Section 4(d) of the ESA provides that the Service shall promulgate regulations they deem "necessary and advisable to *provide for the conservation* of such species," including regulations that apply some or all of the Section 9 prohibitions on take. *Ctr. for Biological Diversity v. Salazar*, 695 F.3d 893, 910 (9th Cir. 2012) (emphasis added) (citing 16 U.S.C. §

1533(d)); *see also* 16 U.S.C. § 1538(a)(1)(G) (making it unlawful for any person to violate regulations promulgated under Section 4(d) for threatened species).

Section 4(d) gives the Service broad discretion to promulgate regulations for threatened species, including provisions pertaining to the amount and types of take allowed. But such discretion is not absolute: it "is limited by the requirement that the regulations [she] is to issue must provide for the conservation of threatened species." *Sierra Club v. Clark*, 755 F.2d 608, 612–13 (8th Cir. 1985); *see also Fund for Animals, Inc. v. Turner*, 1991 WL 206232, at *3 (D.D.C. Sept. 27, 1991) (noting the same).

To provide for the "conservation" of the species means "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking." 16 U.S.C. § 1532(3). The term "conservation" is broader than merely providing for the survival of threatened species. *Gifford Pinchot Task Force v. USFWS*, 378 F.3d 1059, 1070 (9th Cir. 2004). Conservation means the species recovers to the point where it may be delisted. *Id.*

Here, the best available science reveals the 4(d) rule's broad exemptions from Section 9's prohibition on take for trapping and logging projects falls short and fails to further the conservation of wolverine. NEPA and Section 7 consultation is also required on the 4(d) rule. The best available science also reveals wolverine in the lower 48 States qualify for "endangered" status, thus alleviating the need for the rule itself.

(1) The 4(d) rule's blanket exemption from take for trapping will undermine (not further) the conservation of wolverine in the lower 48 States.

The interim 4(d) rule includes a broad exemption for the take of wolverine from otherwise legal trapping for other species in areas occupied by wolverine, "provided the trapping is conducted in accordance with State or Tribal trapping laws and regulations, the trapping is conducted in a manner that uses best practices to minimize the potential capture and mortality of wolverines, and any take of wolverine is reported to the nearest U.S. Fish and Wildlife Service law enforcement office and to the appropriate State wildlife agency or Tribal wildlife authorities within 5 days of occurrence." 50 C.F.R. § 17.40(u)(2)(vi)(B).

In support of this trapping exemption, the Service maintains the incidental take of wolverine in the lower 48 States from trapping "is minimal" and will not "significantly impact" the population. As explained by the agency: "If we assume there are approximately 300 wolverines in the contiguous United States and assume two wolverine mortalities per year for incidental trapping" that would "be only 0.67 percent of the population per year" which will not "inhibit the conservation" of wolverine. This finding, however, conflicts with the best available science.

a. The loss of individual wolverines – even a few – from trapping is a stressor and can undermine the species' conservation in the lower 48 States.

The best available science, including but not limited to Hornocker and Hash (1981), Banci (1994), Landa (1998), Rowland (2003), Copeland (1996), Krebs (2007), and May (2006) reveals the absence of human presence in areas occupied by wolverine is one of the key attributes to protecting and conserving the species.[1] The main human activity that has and continues to harm wolverines is recreational trapping and snaring.

Wolverines are scavengers and sometimes called "trap junkies" because they are often captured and killed in traps set for other species (and are rarely able to be released unharmed). This is particularly true in Montana, Idaho, and Wyoming. 79 Fed. Reg. at 47,540.

Wolverines were likely extirpated from large portions of the western lower 48 States due to human activities, including trapping. FWS-0022314-15. "Early settlers and trappers generally viewed wolverines as vermin because they raided trap-lines, stole food from cabins, and ruined remaining food and belongings with musk and urine . . ." FWS-0022315. As a result, wolverines were "often killed when the opportunity arose and some trappers intentionally poisoned them to prevent destruction of more valuable furbearers." *Id.*

The wolverine's habit of ranging widely in search of carrion, which brings them into contact with baits and traps, makes them especially vulnerable to trapping. 78 Fed. Reg. at 7,880; *see also* FWS-0022315 (Aubry (2007) discussing the same); FWS-0001414 (Hornocker and Hash (1981) discussing the same). Wolverines are routinely caught and killed in traps set for other species, including females. 78 Fed. Reg. at 7,881. "Females with newborn young are limited in their ranging and foraging and are especially vulnerable to easily obtained trap baits." LIT-01414 (Hornocker and Hash (1981)).

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[1] All citations are to studies and other documents already on file with the Service and produced in the agency's bate-stamped administrative record ("FWS-#####, "PI-####" or "LIT-####") in the lead case in the previous and most recent litigation, *Center for Biological Diversity v. Williams*, 20-cv-00181-DWM (D. Mont. 2021).

Evidence from the states and available online reveals wolverines are routinely caught, injured, and usually killed in all types and sizes of traps (e.g., leghold, conibear) and snares. Photos of wolverines caught in various sizes of leghold traps, conibear traps, and snares are available online and in various trapping blogs.

For example, here is a photo of a wolverine caught in a leghold trap (MB-650) that was posted online in a blog post https://trapperman.com/forum/ubbthreads.php/ubb/printthread/Board/21/main/316050/type/thread) (last visited January 15, 2024):

Here are two photos of wolverines caught and killed in wolf snares that are posted online (https://www.cbc.ca/news/canada/thunder-bay/trapper-snares-wolverine-1.5008121)(last visited January 15, 2024):

Here is a photo of a wolverine in a conibear trap from a video posted online (https://www.youtube.com/watch?v=Mq1p3M5wjXM)(last visited January 15, 2024):

As explained by Douglas Chadwick, author of *The Wolverine Way*, "judging from my own experiences helping with field studies in Montana and from many weeks of tagging along as a reporter on other wolverine research projects in Idaho, Wyoming, Washington, British Columbia, and Alberta, my sense is that if you put out a bait station anywhere a wolverine has a territory, the animal is sooner or later going to find that lure. *Gulo gulo* is really expert at this — all the old trappers' blarney about the critters being wily and extraordinarily elusive notwithstanding."

As noted in an internal email to the Service on the wolverine listing: "The problem with wolverine is that very few trappers actually target them. They usually get them as incidental catch . . . . Thus, most trappers don't change their regular behavior in response to wolverine – there are too few of them." As researchers noted in Alberta, most trappers do not directly target wolverine but catch them incidentally in traps set for other species (primarily in traps set for wolves and lynx in Alberta). FWS-0050818. Nearly 700 wolverines were reported caught in traps in Alberta from 1991–2011. *See id.* at FWS-50822-–36.

Hornocker and Hash (1981) reported that many of the wolverines captured and marked for study in Montana "were missing one or more toes and many had broken teeth." LIT-01411. The researchers believed "many of these mutilations were the result of encounters with leg-hold traps." *Id.* In Hornocker and Hash (1981), the authors captured and marked 24 wolverines in the Flathead National Forest during a 5-year period from 1972–1977. LIT-01403. During this study, 15 of the 24 wolverines were killed by trappers, only 3 by natural causes. LIT-01404. An additional 6 wolverines were also caught by trappers in the South Fork of the Flathead River area before the study even began. *Id.* The large number of wolverines killed in traps during the five-year Flathead National Forest study led the researchers to conclude that "of the biotic factors in the wolverine's environment, predation by humans appears to be the most likely factor to have affected the number of wolverines." LIT-01411.

Ruggerio (2007) explained that "no other type of human activity has the same potential to cause populations to become dangerously small or locally extirpated. Thus, decisions concerning wolverine [trapping] appear to be critical to the persistence of extant populations and to the recolonization of depleted populations, especially isolated mountain ranges." LIT-03129.

Indeed, as the Service previously recognized, trapping "could have significant negative effects" on wolverine populations inhabiting small mountain ranges. 78 Fed. Reg. at 7,881; 75 Fed. Reg. at 78,050; LIT-03192. This is because, as noted in Krebs (2004), human-caused wolverine mortality from trapping is "mostly additive" to natural mortality and populations subject to trapping pressure are thus likely to decline (absent immigration from untrapped populations). LIT-01979.

This is why, in the 2013 proposed rule to list wolverine, the Service concluded that "[a] thorough reading of the best science clearly demonstrates that wolverines are susceptible to additive mortality from harvest given the species' low density, low fecundity, and ease of trap-capture due to their proclivity to feed on carrion baits during winter." 79 Fed. Reg. at 47,539; *see also* PI-001254 (Squires' comment noting the same). The Service thus concluded "that trapped populations likely live at densities that are lower than carrying capacity and may need to be reinforced by recruits from untrapped populations to maintain population viability and persistence." 78 Fed. Reg. at 7,880; *see also* FWS-0022315 (wolverine populations with "high levels of human-caused mortality cannot be sustained without immigration from neighboring refugia"). The best available science supports these findings.

For example, a study in British Columbia found that wolverine trapping in 15 of 71 wolverine population units "was unsustainable, and that populations in those unsustainable population units are dependent on immigration from neighboring populations or untrapped refugia." 78 Fed. Reg. at 7,880 (citing Lofroth and Ott (2007), LIT-02076). This finding is consistent with other research studies, including Krebs (2004), LIT-01979, which documented that nearly half of all wolverine mortalities in populations open to trapping were human-induced and that trapped wolverine populations "would decrease . . . in the absence of immigration from untrapped populations." *Id.*

A study documenting trapping in the Greater Yellowstone Area of Montana, Idaho, and Wyoming monitored 26 wolverines (16 females and 10 males) between 2001–2007. LIT-01578. During the project, the researchers documented 11 wolverine mortalities: five mortalities resulted from natural causes and 6 were human-caused, including 5 trapped and 1 roadkill. LIT-01578, 01579. Trapping "accounted for the majority of human-related mortality of wolverines" in the six-year study. LIT-01581. During the six-year period, the study team documented the "production of only 4 offspring." LIT-01580.

In Montana, the "wolverine is especially susceptible to [trapping] . . .due to reduced levels of gene flow, low reproductive rates and need for large areas of undisturbed habitat." LIT-00686; *see also* LIT-003129 (same). As explained by Douglas Chadwick, the author of *The Wolverine Way,* "considering the small size of local wolverine populations in various mountain ranges and the even smaller size of the effective population, the removal of one or two breeding females through 'incidental' trap mortality in some areas would be the exact opposite of incidental. It could spell the end of an isolated subpopulation."

Squires (2007) reveals how trapping just a few individuals (including a pregnant female) can have significant consequences for small, isolated sub-populations of wolverines in Montana. LIT-03192. In that study, the Forest Service's Rocky Mountain Research Station instrumented and followed 36 wolverines in two study areas in western Montana (Pioneer Mountains and Glacier

National Park). LIT- 03192. From 2002–2005, the researchers documented 14 wolverine mortalities (10 males and 4 females) and reported losing contact with 5 additional male wolverines. LIT-03195. Nine of the documented 14 wolverine mortalities (6 males and 3 females) — 64% of the total wolverine mortalities — were attributed to trapping. LIT-03197. According to the researchers, "harvest from trapping was the primary factor that affected wolverine survival." *Id.* Of the 14 wolverines instrumented and followed in the Pioneer Mountains study area, 6 were killed in traps, including 4 adult males and 2 pregnant adult females. LIT-03196, 03197.

Squires (2007) explained that these wolverine mortalities had a "disproportionately large effect on wolverine demography" in the Pioneer study area. LIT-03197. The same study reported that while researchers were able to capture 2 subadults in the Pioneers during the first year of live trapping they failed to capture *any* subadults in the 3 subsequent years, "suggesting that the harvesting of reproductive adults may have suppressed reproduction in the area." LIT-03197. Trapping was the "dominant factor affecting wolverine survival across our study areas." *Id.* According to the researchers: "Given the few individuals that occupy small ranges, localized trapping pressure can affect these small populations despite a moderate state-wide harvest limit." *Id.* The wolverine population in the Pioneer study, for instance, was reduced by an estimated 50 percent from trapping during 2003–2005. *Id.*

Another study, authored by Anderson and Aune (2008), evaluated the fecundity of female wolverines in Montana and showed how significant the cumulative impact of even a small annual trapping quota had been on the state's wolverine population. LIT-03911. Results from the analysis of female wolverines trapped in two regions in Montana between 1985 and 2005 showed that 49 percent of the total 83 females trapped during this 20-year period — a total of 41 wolverines — were pregnant at the time of capture. LIT-03915. The study was divided into a northwest and a southwest region. The percentage of mature females that were pregnant at the time of trapping in the northwest region was 77 percent; the corresponding percent in the southwest region was 48 percent. *Id.*; LIT-03916 (table 1).

When wolverines are caught and killed in traps in Montana and throughout the lower 48 States it is almost always "accidental" or "incidental" to otherwise legal trapping occurring in areas occupied by wolverine.

Banci (1994), for example, found that most of "the current trapper harvest in Montana is believed to be incidental, in sets for other furbearers." LIT-00499, 00500. The Service notes that during the 2008–2009 trapping season two wolverines were incidentally killed in traps set for other species in Beaverhead and Granite Counties in Montana. 78 Fed. Reg. at 7,881. These two mortalities occurred in an area closed to wolverine trapping. *Id.* Other incidents of accidental trapping have also been reported to the Montana Department of Fish, Wildlife and Parks ("MFWP'), including during the 2013–2014 trapping season. *Id.*

The Service reports in the 2023 listing rule that since 2012 there have only been 10 non-target takes of wolverines in traps in Montana and this amounts to less than 1 per year. At least four cases of incidental wolverine trapping have also occurred in Idaho. *Id.* But it is important to emphasize that these figures only reflect *reported* take, which is typically a small percentage of the actual take. The accuracy of these figures is also in question: data from MFWP shows 4 wolverines incidentally caught in Montana in 2023 alone.

Wolverines are also sometimes caught and killed in traps and snares set by agencies engaging in "predator control" efforts. The Montana Department of Livestock authorizes predator control efforts and does so without any oversight or obligation to report take, including take of wolverine. The U.S. Department of Agriculture Wildlife Services incidentally trapped at least five wolverine while attempting to trap wolves (one in 2004, 2005, 2010, 2018, and 2019), and another wolverine was incidentally trapped in Wyoming in 2006. 78 Fed. Reg. at 7,881. These are just the reported cases. Evidence of wolverine being accidentally caught in traps and snares set for other species is well documented in the scientific literature. *See, e.g.,* LIT-01414; LIT-01580-81. Last fall, a wolverine was also shot and killed near Wisdom, Montana.

Notably, the trapping and killing of one wolverine (either intentionally or accidentally) within a small, isolated subpopulation can result in serious harm to the population. LIT-03197; *see also* LIT-01985, 01986; LIT-02072.

Indeed, the trapping and killing of two pregnant females within a small, isolated subpopulation can have significant negative consequences and reduce "isolated populations beyond sustainable levels." LIT-03198. The incidental mortality of wolverines from trapping can be significant "due to the need for individuals to successfully move between habitat patches." FWS-0057029. Even in small numbers, such "mortalities are likely to be problematic when habitat and populations are contracting due to climate change." *Id.* The removal of a single, reproducing female wolverine can be severe and "has the potential to reduce population trend from increasing to stable to decreasing." FWS-0014985 (comment bubble no. 3).

As explained by Rick Yates in his public comments on the 4(d) rule, wolf trapping in Montana can pose a threat to wolverine population viability: "Wolverine females whelp between mid-February and early-March, it is conceivable that pregnant females and even females with kits in natal dens will be incidentally taken in wolf traps or snares . . . . There needs to be some way to keep incidental take at an absolute minimum. I think the best way to do this is to designate "no-trap zones" adjacent to occupied wolverine habitat."

During the peer review process, Schwartz raised concerns about this issue and the Service's decision to discount the threat posed by trapping and incidental take. PI-001246. Schwartz noted

that any such position would need to be supported by a Population Viability Analysis ("PVA") but no such analysis exists. *Id.* This was one of the major shortcomings in the Service's previous decisions not to list the species. According to Schwartz, it is "possible that even a minimum amount of trapping of a population of such small size, targeted on the right age class could be important." *Id.*

Notably, there are a number of recent studies on the impacts of wolverine trapping on population viability in Canada (where targeted trapping is allowed and where incidental trapping occurs). These studies demonstrate that the current rate of wolverine trapping in southern Canada is unsustainable and that trapping disproportionately impacts younger wolverines that are most likely to constitute the dispersers that the Service relies upon to ensure connectivity with the lower-48 population. *See* FWS-0048770–83 (Mowat (2019)); *see also* FWS-0033542–49 (Kukka (2017)). Although the ultimate cause of the lack of connectivity between wolverines in the contiguous United States and wolverines in Canada is not known with certainty, the Service previously determined that it may be related to "harvest management in southern Canada." 75 Fed. Reg. at 78,053. These recent findings demonstrate that unsustainable exploitation of wolverines in Canada threatens wolverines in the lower-48 by impeding dispersal of Canadian wolverines across the international border. *Id.* The same is true in the lower 48 States where trapping can undermine wolverine movement and effective migration, necessary for the long-term viability of the species.

One study, authored by Lofroth (2007), evaluated the sustainability of wolverine trapping and hunting in British Columbia, Canada from 1985–2004. FWS-0034161. The authors noted that wolverine removal in British Columbia averaged roughly 172 wolverines per year and removals in individual population units ranged from 0 to 280 per year. *Id.* Fifteen of the 71 population units had trapping levels that were deemed unsustainable. *Id.* Reports from management units along the southeastern border of British Columbia (just north of Idaho and Montana) revealed that from 1985 to 2004 well over 200 wolverines were trapped. *Compare* FWS-0034163 (Figure 2) *with* FWS-0034165 (Table 1). From 1985–2004, unit 48 reported 28 wolverines trapped. FWS-0034164. Unit 58 reported 81 wolverines trapped; 2 hunted. *Id.* Unit 61 reported 42 wolverines trapped; 2 hunted. *Id.* Unit 63 reported 42 wolverines trapped; 2 hunted. *Id.* Unit 72 reported 3 wolverines trapped. FWS-0034165. Unit 70 reported 33 wolverines trapped. *Id.* These are just the reported incidents from the southeastern corner of British Columbia. *Id.*

More recent studies have further evaluated how trapping functions as a barrier to the movement of wolverines across the international border. Mowat (2020), for example, evaluated the sustainability of wolverine trapping in southern Canada, along the border region. FWS-0048770. The study noted that range declines, habitat connectivity, and trapping have created conservation concerns for wolverines in southern Canada. *Id.* Trapping mortality in southern Canada was deemed unsustainable and the study recommended that wolverine trapping mortality be reduced

by at least 50 percent throughout southern British Columbia and Alberta to promote population recovery. *Id.* Most alarmingly, the study documented that unsustainable trapping was mostly likely to impact young wolverines most likely to constitute dispersers carrying new genetic material into the lower-48 population. *Id.*

To reach these conclusions, the Mowat (2020) study sampled wolverines during six winters between December 2010 and April 2016. FWS-0048776. The study concluded that wolverine trapping "is likely not sustainable in southeast British Columbia and southwest Alberta" and the current level of mortality from trapping in this region "presents considerable risk to this population." FWS-0048778. This is consistent with other findings in other papers, including Krebs (2004), Squires (2007), and Dalerum (2008). *Id.*

The Mowat (2020) study also noted that the conservation risk to wolverines from trapping in southeastern British Columbia and southwestern Alberta is "high because wolverines occur in a discontinuous fashion at low densities and have few young, and reproduction is affected by environmental stochasticity." FWS-0048779.

Trapping, in particular, has the potential to negatively affect connectivity or linkage and meta-population dynamics for wolverines in the lower 48 States. Aubry (2007) explains that wolverines in the contiguous United States likely exist as a metapopulation. As explained by the Service, a metapopulation "is a network of semi-isolated populations, each occupying a suitable patch of habitat in a landscape of otherwise unsuitable habitat . . . . Metapopulations require some level of regular or intermittent migration and gene flow among subpopulations, in which individual populations support one another by providing genetic and demographic enrichment through mutual exchange of individuals. Individual subpopulations may go extinct or lose genetic viability, but are then 'rescued' by immigration from other subpopulations, thus ensuring the persistence of the metapopulation as a whole." 75 Fed. Reg. at 78,031. Some of the subpopulations within this metapopulation are extremely small and vulnerable, some consisting of less than 10 individuals. 78 Fed. Reg. at 7,867.

The loss of a single individual wolverine – especially a dispersing female – can thus be significant not only for the population itself but for connectivity and functioning meta-population dynamics. According to the best science, if the metapopulation dynamics break down, either due to changes within the subpopulation or due to the loss of connectivity (from climate change, trapping, or development) then "the entire metapopulation may be jeopardized due to subpopulations becoming unable to persist in the face of inbreeding or demographic and environmental stochasticity." 78 Fed. Reg. at 7867.

In many subpopulations of wolverine, therefore, the loss of a single individual can be significant. Indeed, as mentioned below and described in Schwartz (2009), the effective population

of wolverines in Montana is likely less than 35 and the effective population in the lower 48 States is likely less than 50. And, as outlined in McKelvey (2011), this population is currently facing the threat of climate change which is resulting in increased habitat fragmentation (less connectivity) and — by 2045 — is projected to result in a 33% or greater reduction in the amount of available wolverine habitat in the contiguous United States. Decreased connectivity and additional losses of wolverine habitat will result in the additional loss of wolverine populations, especially in Montana's smaller mountain ranges. 75 Fed. Reg. at 78,045. The Service itself notes that the projected loss in habitat "should result in a loss of wolverine numbers that is greater than the overall loss of habitat area." *Id.* at 78,045. Under these circumstances, *every individual* wolverine in the DPS counts and no mortalities are incidental to the DPS.

For example, Squires (2007) estimated that four mountain ranges in western Montana collectively contained only about 13 wolverines. Such densities are too low for long-term persistence without connectivity to other populations." The trapping and killing of even one wolverine (either intentionally or accidentally) from this isolated population can result in serious harm to the population and the trapping and killing of two pregnant females is devastating to the local population.

Based on data from the Glacier Wolverine Project (2002–2007), for instance, researchers determined that the population in the protected park where no trapping occurs "was stable to just very slightly increasing." Chadwick, *The Wolverine Way* at 250 (2010). But, using the same data, they predicted "that the additional death of one more adult, particularly a breeding-age female, would have put the population on a downward trend. Two such deaths would have made for a much sharper rate of decline." *Id.*

In *The Wolverine Way*, Douglas Chadwick explains how this occurs: "Wolverine females don't produce offspring until at least age three and then have two kits per litter every other year, on average . . . . So, in a female's breeding life, which would end after around age ten, she'll have three litters and a total of six kits. The sex ratio is 50:50, so we've got three new males and three new females in the population. Half those kits will die before reaching maturity. Now we're down to 1.5 males and 1.5 females as the offspring. One of each has to survive and stick around to replace their parents in the population. That leaves half a male and half a female to disperse and carry genes somewhere else. You can see how a small change in the number of breeding females would make a big difference." *Id.*

If a nursing mother "is taken in a trap anywhere within her wide hunting range, you'd have to subtract both that breeding-age female and her young starving back in the den from the population." *Id.* Likewise, should "the resident adult male be trapped instead during the course of his still wider and more frequent travels, a transient male could come in and kill the kits. If the newcomer doesn't kill them, the kits still grow up with less protection from other wolverine and

less experience gained from traveling with a father after they separate from the mother. Both factors lower the offspring's chances of successfully reaching adulthood and either replacing numbers in the population or transporting genes to other homelands." *Id.*

Wolverine are particularly vulnerable when they leave protected areas, like National Parks (where trapping is prohibited) or remote wilderness areas (where trapping is more difficult and less likely). As explained in *The Wolverine Way*, the mortality data from dispersing wolverines show they run a "fairly high risk of being killed by people outside strictly protected lands such as national parks."

M8 – a subadult male wolverine – for example, was killed in a trap after leaving Glacier National Park and travelling to Northwest Montana.

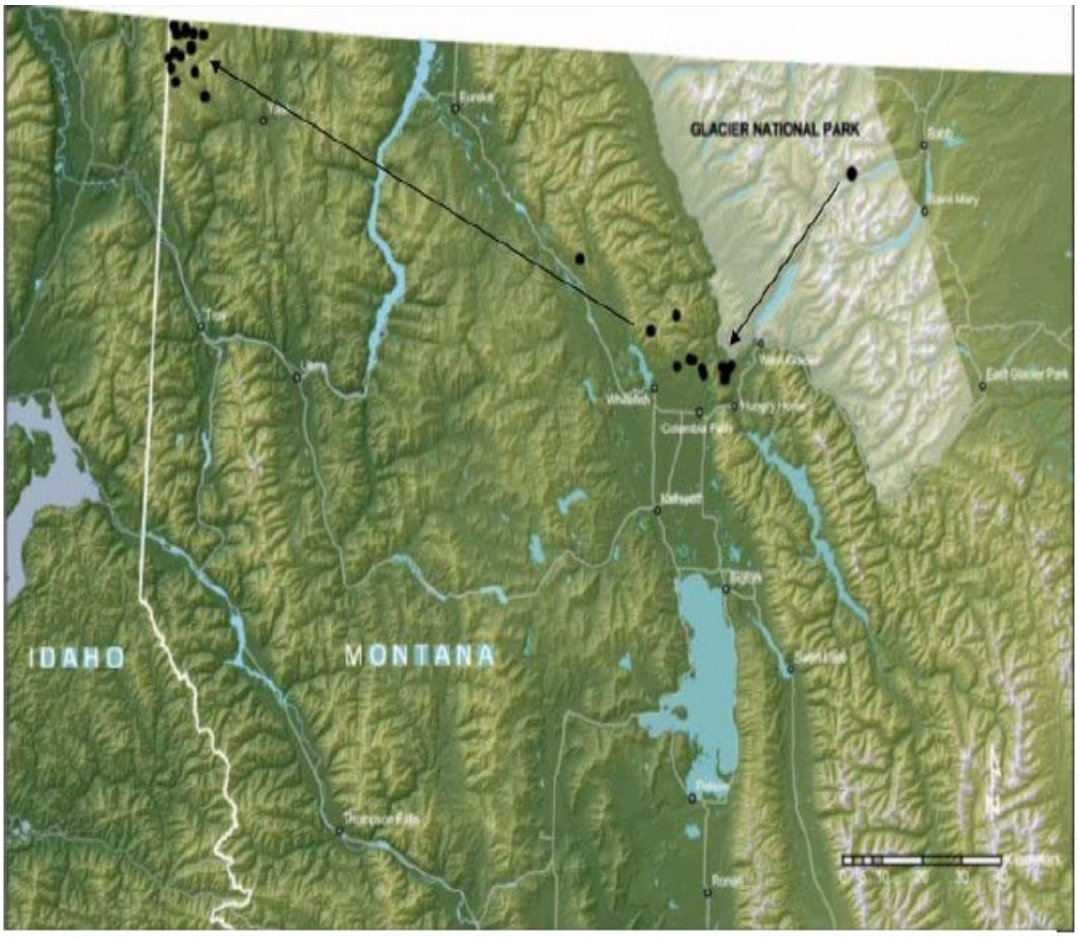
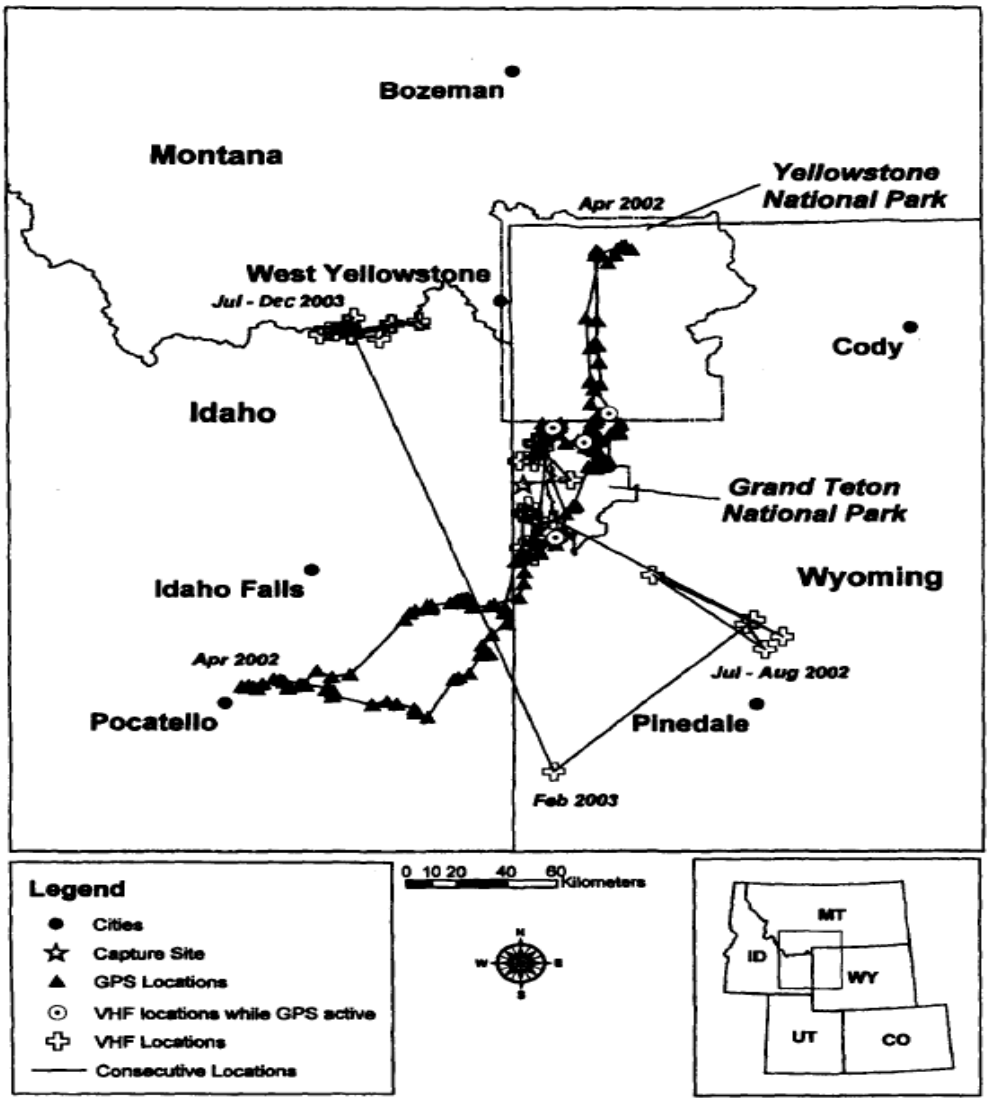


Figure 4. Black dots represent the locations of subadult male M8. Black arrows depict his direction of movement from the east side of Glacier National Park subsequent to his capture in February 2004. M8 moved over 200 kilometers to Northwest Montana where he was subsequently taken by a trapper in December, 2004.

As similar incident occurred during the Greater Yellowstone study. One young male wolverine in the Yellowstone study – M304 – covered approximately 412 km in 19 days, traveling from Grand Teton National Park, Wyoming to the Portneuf Range just east of Pocatello, Idaho, and then subsequently returning to the Teton Range. Soon afterward, he moved north to Mount Washburn in the northern portion of Yellowstone National Park and back to the Teton Range, traveling approximately 226 km in 7 days. M304 was eventually killed by trappers in Montana (in the Centennial Range) on January 11, 2004.



Inman (2008) notes that Montana's decision to close part of the State to intentional wolverine trapping of even a few individuals "could result in higher adult female survival, which is influential in population growth rate . . .Protection in WMU 4 could also result in higher survival

of young dispersing wolverines as they move through these mountain ranges. In essence, closing WMU 4 maximizes the chance that these areas are source areas rather than sinks." Conversely, authorizing wolverine trapping or trapping for other species in wolverine habitat does just the opposite by increasing the chances that these areas are sinks rather than sources.

b. The wolverine population in the lower 48 States lacks sufficient genetic diversity and is too small (both census and effective size) to exempt incidental take from trapping.

The Service's decision to exempt take of wolverines from trapping and related finding that losing a few wolverines a year would be "minimal" and not undermine conservation efforts in the lower 48 States was informed mainly by Mowat (2020)'s 4% rule for allowable take and studies from Canada – i.e., where the 4(d) rule does not apply, where population numbers are significantly higher, where there is more genetic variation and diversity in the wolverine population, and where the meta-population dynamics are less in play.

As explained by Jeff Copeland, Mowat (2020)'s 4% rule for take in Canada has little to no bearing on wolverine in the lower 48 States. Canadian wolverine populations are largely ubiquitous whereas wolverine populations in the lower 48 States are highly fragmented. The 4% figure probably works for Canada because they are dealing with a "source-sink" situation in which untrapped populations sustain smaller subpopulations that are always being trapped out. The 4% is about avoiding the trapping-out of these areas such that immigrants can "top-off" the reducing population. In the lower 48 States, however, wolverine populations are naturally fragmented and are nowhere near as likely to enjoy "rescue" from nearby immigrants.

The wolverine population in the lower 48 States is also experiencing low genetic diversity and linkage and connectivity between isolated subpopulations is critical to conservation efforts. Losing a few individuals a year in the lower 48 States, therefore, is unlike Canda and not "minimal" – on the contrary, it may undermine conservation efforts, especially if a dispersing female is lost.

The best available science reveals wolverines in the contiguous United States are thought to be derived from a "recent" recolonization event from Canada in the early 1900s after they were likely extirpated from the area. 78 Fed. Reg. at 7,884, 7,885. Zigouris (2013) evaluated patterns in wolverine DNA and concluded that the species likely originated from a single refugium in Beringia that extended itself into a larger, North American population that extended from Alaska through western Canada and into the western contiguous United States. FWS-0046812; *see also* FWS-0048802 (describing paper).

Relevant here, Zigouris (2013) found the greatest haplotype diversity in northwest Canada and Alaska and the lowest diversity in the lower 48 States (which was a small subset of the

haplotypes found in Canada). *Id.* McKelvey (2014) analyzed additional data from wolverine specimens in the lower 48 States and Canada and determined that, collectively, these data indicate that wolverines in the lower 48 States were likely extirpated by the early 20th century and modern populations are likely immigrants from Canada. FWS-0036550.

Wolverines in the lower 48 States therefore have reduced genetic diversity relative to the Canadian population as a result of founder effects or inbreeding. 78 Fed. Reg. at 7,885.

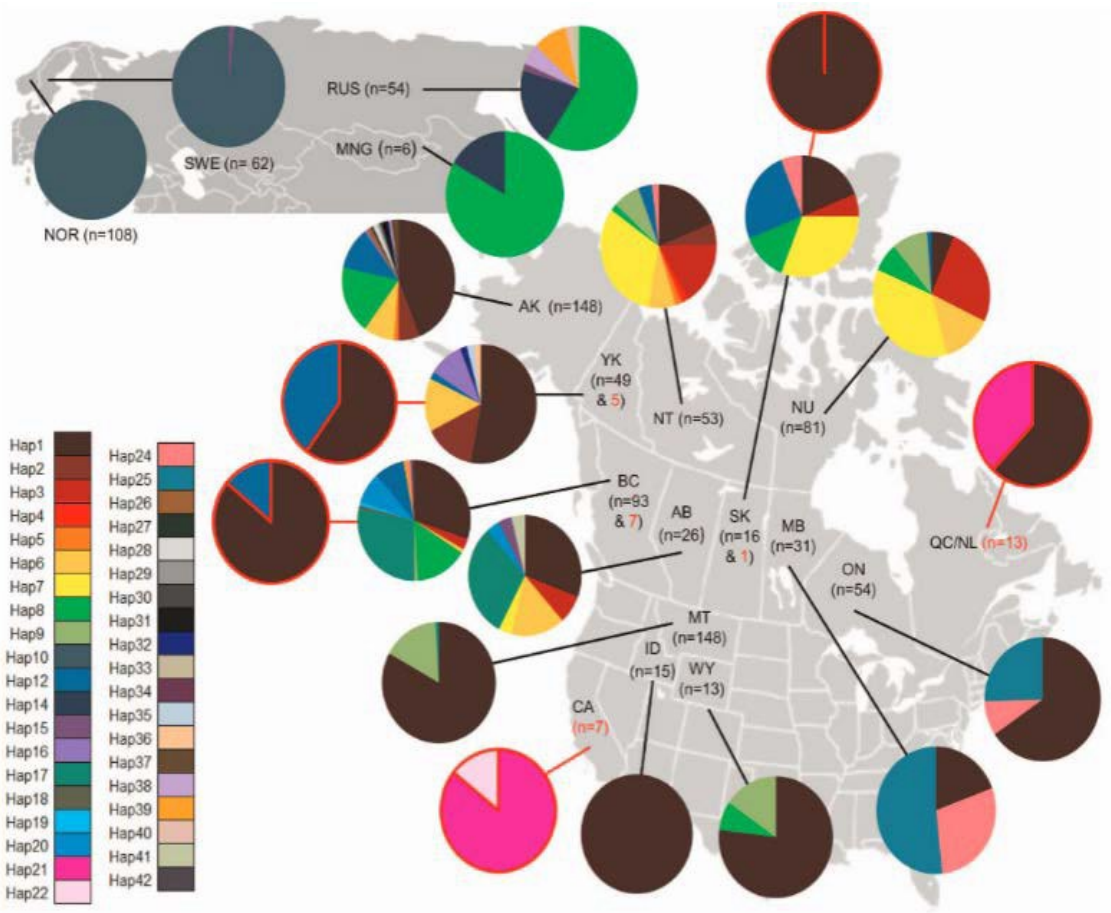


Figure 3. Geographical distribution of mtDNA haplotypes. The geographic distribution of mtDNA control region haplotypes based on frequencies observed for each region. Historic samples are presented separately and identified with a red border and red sample size number. doi:10.1371/journal.pone.0083837.g003

FWS-0046817.

This low genetic diversity is a concern, especially because, as discussed below, the wolverine population in the lower 48 States is estimated to number only around 300 animals with the majority in the northern Rocky Mountains. Further, a substantial number of these individuals are

not breeders or are unsuccessful breeders (i.e., part of the census but not effective population). 78 Fed. Reg. at 7,884; *see also* FWS-0030729 (Inman (2013) estimating the population to be roughly 318 individuals); 85 Fed. Reg. at 64,634.

Accordingly, the "effective population size"— a biological term indicating the portion of the population that breeds and contributes genetic material to sustaining the species — averages only 35 in the northern Rockies, which is considered the most genetically robust of the existing subpopulations, but is, nonetheless, well below the effective-population requirements for long-term viability. 85 Fed. Reg. at 64,639 (citing Schwartz (2009), FWS-0038708).

A 2016 estimate of the effective population size by the same biologist, Schwartz — which is based on two different approaches (genetic data and rule of thumb which estimates that effective populations are roughly 10-11 percent of a census size) — puts the effective population size for wolverines in the lower 48 States at 35-38. FWS-0013569. In Schwartz's opinion, this "suggests vulnerability to the species." *Id.* For this reason, the U.S. Forest Service's Rocky Mountain Research Station scientists — including Schwartz — have advised that this estimate of effective population size suggests that wolverines in the Rocky Mountains are at a level where there should be "concern." FWS-0048363; *see also* PI-001246; PI-001294.

Effective population size is important because it determines rates of loss of genetic variation and the rate of inbreeding. 78 Fed. Reg. at 7,884. "The smaller the effective population size, the more reproduction in each is dominated by a few individuals in each generation." *Id.* "Populations with small effective population size show reductions in population growth rates and increases in extinction probabilities when genetic diversity is low enough to lead to inbreeding depression." *Id.* "[F]or short-term (a few generations) maintenance of genetic diversity, effective population size should not be less than 50." 79 Fed. Reg. at 47,542.

This minimum requirement for genetic integrity derives from the 50/500 rule introduced by Franklin (1980), which suggests that, "in the short term the effective population size should not be less than 50 . . . [and] in the long term the minimum effective population size should be 500." FWS-0027546–47. Allendorf and Luikart (2007) described the 50/500 rule as "analogous to a warning light on the dashboard of a car." LIT-000388. Allendorf and Luikart (2007) determined that while there are many problems with the use of a simple rule — like the 50/500 rule outlined in Franklin (1980) — such rules provide a "useful guideline" for managing wildlife populations. LIT-00388. If the effective population of an isolated population is less than 50, then "we should be concerned about possible increased probability of extinction because of genetic effects." *Id.* "It is also important to remember that 50/500 is based only on genetic considerations. Some populations may face substantial risk of extinction because of demographic stochasticity before they are likely to be threatened by genetic concerns." LIT-00389.

Another and more recent study, Frankham (2014), suggests that Franklin's (1980) "50/500 rule" may be inadequate for preventing inbreeding depression over five generations in the wild and proposes a new "100/1000 rule", i.e., that an effective population of at least 100 individuals is required to limit the loss of total fitness to less than 10 percent and that at least 1,000 individuals are required to retain evolutionary potential for fitness in perpetuity. FWS-0027530. Frankham (2014) also concluded that "population fragmentation is a serious genetic threat to the persistence of populations for many species." FWS-0027534.

Notably, for wolverines, there are several contributing factors that may limit the species' effective population size. 78 Fed. Reg. at 7,884. High-quality home ranges for wolverines — especially in the lower 48 States — are limited and individuals occupying these home ranges are better able to reproduce such that only the mature males and females that can successfully acquire and defend a territory will dominate reproduction. *Id.* There is also a "tendency in wolverines for a few males to monopolize the reproduction of several females, reducing reproductive opportunities for other males." *Id.*

Concern over low effective population size of wolverines in the lower 48 States was highlighted in Cegelski (2006). FWS-0024714. Cegelski (2006) determined that, without immigration from other wolverine populations, at least 400 breeding pairs of wolverines would be necessary to sustain the long-term viability of wolverines in the northern Rocky Mountains. *Id.*

In its 2013 Proposed Rule, the Service concluded that the effective population size of the remaining wolverine population in the lower 48 States is "below what is thought necessary for short-term maintenance of genetic diversity." 78 Fed. Reg. at 7,884. "Given that wolverine subpopulations in the DPS are already so small, and movement between subpopulations so restricted, inbreeding has become likely." *Id.* at 7,885 (citing several studies).

The Service estimates the number of breeding pairs it recognizes would be necessary to sustain the long-term genetic viability of the northern Rocky Mountains wolverine population is 300 breeding pairs. 85 Fed. Reg. 64,639. But the current total population of 300 is not even close to this figure. The "entire population is likely only 250 to 300" individuals "with a substantial number of these being unsuccessful breeders of nonbreeding subadults." 78 Fed. Reg. at 7,884 (citing to Inman (2010b)).

Furthermore, in its previous 2013 Proposed Rule findings, the Service found that "[g]enetic drift has already occurred in subpopulations of the contiguous United States: Wolverines here contained 3 of 13 haplotypes found in Canadian populations." 78 Fed. Reg. at 7,884–85 (citing Kyle and Strobeck (2001), Cegelski (2003), Cegelski (2006), Schwartz (2007), and Schwartz (2009)); *see also* FWS-0046812 (Zigouris (2013) documenting the same); *see also* FWS-0036550 (McKelvey (2014) documenting the same); FWS-0048801 (2016 summary of genetics papers). The

Service went on to note that not only has genetic drift occurred "but also some level of genetic separation; if these populations were freely interbreeding, they would share more haplotypes." 78 Fed. Reg. at 7,885 (citing Schwartz (2009)).

These genetic differences "are the result of loss of genetic diversity, either through genetic drift or founder effects." 75 Fed. Reg. at 78,042. Such differences were deemed a "conservation concern because it reflects loss of genetic diversity through inbreeding." *Id.* "The haplotypes found in these subpopulations were a subset of those in the larger Canadian population, indicating that genetic drift had caused a loss of genetic diversity." 78 Fed. Reg. at 7,885; *see also* FWS-0036553 (McKelvey (2014)).

The best available scientific information supports the Service's 2013 Proposed Rule findings related to genetic drift. A study authored by Schwartz (2007) found that 71 of 73 sampled wolverines in the northern Rocky Mountains expressed a single haplotype, indicating both genetic drift and genetic isolation. *Id.*; FWS-0038704. This same study determined that wolverines in California "were genetically distinct from extant populations, suggesting long-term isolation." FWS-0038698. Another study determined that the likely "small effective size of the Idaho population [of wolverines] has led to rapid genetic drift and the current distinctiveness of this population." FWS-0033588 (Kyle and Stroebeck (2002)).

McKelvey (2014) evaluated additional wolverine data from the lower 48 States and Canada and found that modern wolverine samples exhibited patterns in the geographic distribution that were similar to those reported in Schwartz (2007). FWS-0036553. Modern wolverine samples in the lower 48 States were dominated by a single haplotype —haplotype A (one notable exception were wolverines in Washington's northern Cascade Range where all 18 samples analyzed were haplotype C). *Id.*

One of the "key findings" of McKelvey (2014) was that the modern samples of wolverines in the lower 48 States "exhibited lower haplotype diversity and a subset of haplotypes (primarily haplotype A)" found in Canada. FWS-0048803.

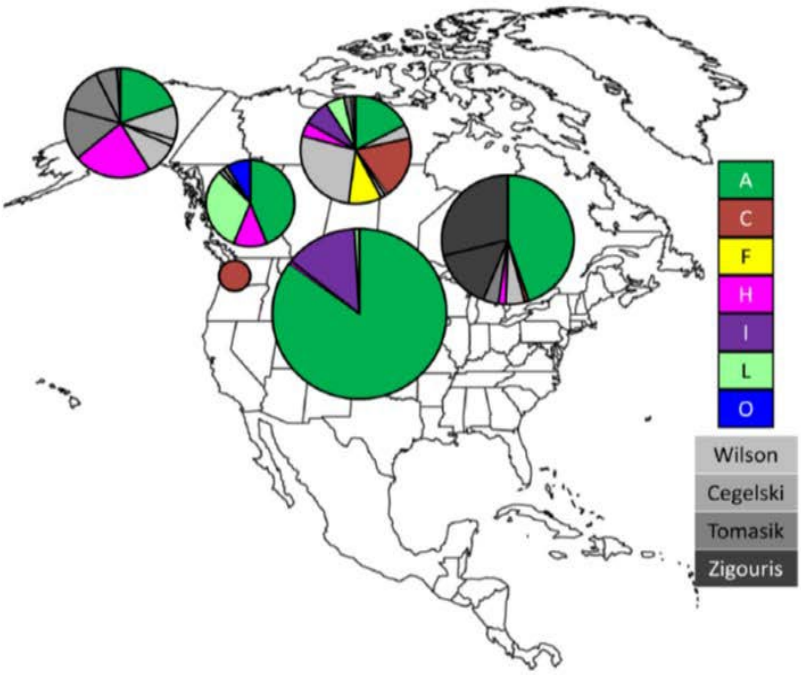


Figure 2. A simplified presentation of wolverine population structure among modern wolverine populations in North America. Colored wedges are haplotype that either occur in modern populations or occurred in historical populations within the contiguous U.S. A, C, F, H, and I refer to haplotypes identified b Wilson et al. (2000), and L and O by Cegelski et al. (2006). Grayed wedges, representing haplotypes only found in Alaska or Canada, are grouped by the pape where they were first published. Wilson refers to Wilson et al. (2000), Cegelski to Cegelski et al. (2006), Tomasik to Tomasik and Cook (2005), and Zigouris t Zigouris et al. (2012). Pie chart sizes approximate the total number of samples from each area.

FWS-0036553.

Another study, authored by Pilgrim and Schwartz (2018), tested 208 samples identified as wolverine for mitochondrial DNA haplotype. FWS-0037850. The samples were submitted under the auspices of the 2016–2017 Multi-State Wolverine Survey. *Id.* The study determined that 163 of the 208 samples had sufficient DNA to produce a haplotype. *Id.* From these 163 samples, only two haplotypes were identified: 146 samples from Idaho, Montana, and Wyoming matched haplotype A and 17 samples collected in Washington matched haplotype C. *Id.*

These findings are consistent with the published literature, including Cegelski (2006), Zigouris (2013), and McKelvey (2014). *Id.* These findings were also recently published in Lukacs (2020), which noted that all of the wolverine samples from Montana, Wyoming, and Idaho were haplotype A and all the samples from Washington were haplotype C. FWS-0035591.
The reduced number of haplotypes in the lower 48 States of wolverines is "likely the result of the fragmented nature of wolverine habitat in the United States and is consistent with an emerging pattern of reduced genetic variation at the southern edge of the range documented in a suite of boreal forest carnivores." 78 Fed. Reg. at 7,885 (citing Schwartz (2007)).

To mitigate the deleterious effects of low haplotype diversity, Cegelski (2006) posited that migration is critical to maintain genetic diversity in wolverines in the lower 48 States and that at least two "effective migrants" from Canada would be required per generation to maintain genetic diversity. FWS-0024726. The study further suggested that the "demographic viability of wolverines in the contiguous U.S. would depend on movement of female wolverines into new territory." FWS-0048804.

Yet, the reduced genetic diversity and gene flow for wolverines coincides with the international boundary with Canada and "indicates that individuals are not passing freely between Canadian and U.S. populations." 75 Fed. Reg. at 78,041 (citing Schwartz (2009)). The best available science reveals immigration of wolverines from Canada is not likely to bolster the genetic diversity of wolverines in the United States. 78 Fed. Reg. at 7,885.

Schwartz (2009) determined that there is an "apparent lack of connectivity between wolverine populations in Canada and the United States" as demonstrated by genetic data. 75 Fed. Reg. at 78,053; FWS-0038716. In 2016, Schwartz noted that the small wolverine population in the lower 48 States was likely vulnerable and that gene flow from the north is "very limited" and the two populations are "becoming isolated." FWS-0013569.

The best available science, including Cegelski (2006), Schwartz (2009), and Schwartz (2007), also reveal there is likely a "distinct break" between the Canadian and lower 48 States populations. 75 Fed. Reg. at 78,042. Specifically, Schwartz (2009) said the disparity between haplotypes of wolverines in the lower 48 States and wolverines in Canada suggest "marked separation between these samples." FWS-0038715. Schwartz (2009) also noted that migration and additional gene flow into the lower 48 States from Canada "appears minimal." FWS-0038715. Schwartz (2009) cites Kyle and Strobeck (2002) and Cegelski (2006) in support of this finding. *Id.*

Kyle and Strobeck (2002), in turn, determined that wolverines in Idaho were likely fragmented from wolverine populations in Canada. FWS-0033588; *see also* FWS-0033569 (Kyle and Strobeck (2001), which also documented restricted gene flow and lack of connectivity in the Idaho wolverine population). Kyle and Strobeck (2002) also determined that it was "unclear" if any wolverine gene flow was occurring between Wyoming and Canada. *Id.* Kyle and Strobeck (2002) concluded that historic persecution and displacement from native habitat in the lower 48 States may have resulted in smaller populations, partially fragmented from what was once, likely, a panmictic unit (in North America) (meaning one in which random mating may occur). FWS-0033589.

The lack of connectivity between wolverines in the lower 48 States and Canada — as determined by the best available science, including Schwartz (2009) — "prevents the influx of

genetic material needed to maintain or increase the genetic diversity in the contiguous United States." 75 Fed. Reg. at 78,053; see also 78 Fed. Reg. at 7,885 (same). "The continued loss of genetic diversity may lead to inbreeding depression, potentially reducing the species' ability to persist through reduced reproductive output or reduced survival." *Id.*; *see also* 78 Fed. Reg. at 7,885 (same). The Service previously stated that restoring connectivity with Canada "may require international cooperation to establish appropriate control of exploitation in the international border region." 75 Fed. Reg. at 78,053.

The Service's decision to exempt wolverine take from trapping in the interim 4(d) rule, therefore, must be (but was not) viewed in the context of an extremely small effective and total population that is likely already experiencing genetic drift. Unlike Canada and the situation and management implications discussed in Mowat (2020), unnecessarily losing two wolverine a year to recreational trapping in areas occupied by wolverine in the lower 48 States – even assuming that figure is correct – is not "minimal." Such a loss is two too many when one considers the low genetic diversity and low effective and total population numbers in the lower 48 States and how that may affect meta-population dynamics.

c. Allowing an exemption from take for trapping in the 4(d) rule cannot be viewed in a vacuum but must be considered in combination with other, cumulative stressors to wolverine in the lower 48 States.

The ESA directs the Service to analyze whether any one "or a combination" of Section 4(a)(1) of the ESA's five threat factors threaten wolverine. 50 C.F.R. § 424.11(c). The Service's exemption for take from trapping (as well as logging), therefore, cannot be viewed in isolation but must be considered in the context of other, cumulative threats and stressors negatively affecting the species in the lower 48 States.

With respect to wolverine, for instance, the best available science reveals the species is subject to multiple, synergistic threats. This includes climate change, as well as small population size and low genetic diversity which "when considered cumulatively, . . . make the species more vulnerable to other stressors." FWS-0057030. Other, secondary threats to wolverine also exist.

These include new scientific information from Heinemeyer (2019) revealing winter recreation in areas where wolverine den can result in indirect habitat loss, FWS-0028739, and, as previously mentioned, the threat posed by trapping and snaring. Private land development and highways and roads can also impede wolverine movement and connectivity, *see* FWS-0030730, FWS-0028613, and logging (see below) are also additional threats. Collectively all of these threats could imperil wolverine: A "small amount here, a small amount there, and still more at another point could add up to something with a much greater impact, until there comes a point where

even a marginal increase will mean" the species does not survive. *Klamath-Siskiyou Wildlands Ctr. v. BLM*, 387 F. 3d 989, 994 (9th Cir. 2004).

For wolverine, the best available science, including, but not limited to, Copeland (2010), McKelvey (2011), and Schwartz (2009) all demonstrate that trapping wolverines, when added to the other existing threats to the species (climate change and an already small population), has harmed, is harming, and will continue to harm an already fragile population in Montana. But in the interim 4(d) rule, the Service never carefully evaluates, analyzes, and considers these combined threats. Nowhere does the Service apply the best available science and evaluate how its decision to exempt trapping from take and the anticipated loss of two wolverines a year, in conjunction with existing threats from climate change, small population size, low genetic diversity, incidental trapping, poaching, vehicle collisions, and other secondary threats may cumulatively threaten wolverine. This is a major oversight and one that, if corrected, warrants a new 4(d) rule without exemptions for take from trapping (or logging).

d. Allowing an exemption from take for trapping in the 4(d) rule alleviates the need for the states to obtain an ITP and prepare a habitat conservation plan which would benefit conservation efforts and require affirmative steps be taken to protect wolverine.

Section 9 of the ESA prohibits any person from taking an endangered species, whether intentional or not. 16 U.S.C. § 1538(a)(1)(B). "Any taking and every taking — even of a single individual of the protected species — is prohibited by the Act." *Loggerhead Turtle v. County Council of Volusia County, Florida*, 896 F. Supp. 1170, 1180 (M.D. Fla. 1995), *aff'd by Loggerhead Turtle v. County Council of Volusia Co.*, 148 F.3d 1231 (11th Cir.1998), *cert. denied*, 526 U.S. 1081 (1999).

The word "take" in the ESA is defined broadly and means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532 (19). Congress intended the word take to be defined in the "broadest possible manner to include every conceivable way" in which a person could harm or kill fish or wildlife. S. Rep. No. 307, 93rd Cong., 1st Sess. 1, reprinted in 1973 U.S. Code Cong. & Admin. News 2989, 2995.

Notably, to qualify as a take under the ESA, the harm to the species need not be purposeful. Rather, take may occur as the result of an accident, i.e., it might be incidental to an otherwise legal activity. *See Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687, 704 (1995); *National Wildlife Federation v. Burlington Northern Railroad*, 23 F. 3d 1508, 1512 (9th Cir. 1994). In other words, the intentional, purposeful, accidental, and/or incidental take of a listed species is treated the same for purposes of Section 9 of the ESA. Intent is irrelevant.

The ESA's prohibition on take only applies to endangered species. The Service, however, has extended that take prohibition to all threatened species unless exempted by a special 4(d) rule. 50 C.F.R. § 17.31 (a). An exemption from take under a special 4(d) rule – like the trapping and logging exemptions at issue here – controls and dictates what take is or is not allowed.

Importantly, take coverage under a special 4(d) rule alleviates the need for private entities or states to obtain an incidental take permit ("ITP") and submit a related habitat conservation plan under Section 10 of the ESA, 16 U.S.C. § 1539(a)(1)(B). This is problematic for wolverine.

For example, in the absence of the 4(d) rule exempting take from trapping, states like Montana, Idaho, and Wyoming would likely need to apply for and obtain an ITP to authorize otherwise legal trapping in areas occupied by wolverine. This in turn, would result in additional protections for wolverine.

Section 10(a)(1)(B) of the ESA creates a limited exception to the ESA's take prohibition by authorizing the Services to permit the take of listed species that *incidentally* results from otherwise lawful activities. 16 U.S.C. § 1539(a)(1)(B). In return for minimizing and mitigating the impacts of the authorized take, the permit holder gains long-term regulatory certainty including "permit shield" protections against civil and criminal liability under the ESA. *See generally* 16 U.S.C. §§ 1538(a)(1), 1540. Even if circumstances change after issuance of an incidental take permit, the Services' "No Surprises" policy prohibits the Services from imposing additional resource or management restrictions without the consent of the permit holder. 50 C.F.R. § 17.32(b)(5); 50 C.F.R. § 222.307(g).

Because the permit allows otherwise illegal harm to an imperiled species, Section 10 of the ESA sets forth a rigorous and detailed application process for an ITP that the applicant and the Services must follow prior to permit issuance. *Sierra Club v. Babbitt*, 15 F. Supp. 2d 1274, 1282 (S.D. Ala. 1998).

To obtain an ITP, the applicant must develop a habitat conservation plan that specifies: the impact that will likely result from the permitted taking; the steps the applicant will take to minimize and mitigate such impacts; the funding that will be available to implement such steps; what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and such other measures that the Service may require. 16 U.S.C. § 1539(a)(2)(A).

Before issuing an ITP, the Service must also find that: the permitted taking will be incidental; the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; the applicant will ensure that adequate funding for the plan will be provided; the taking will not appreciably reduce the likelihood of the survival and recovery of the

species in the wild; and that any additional measures required by the Service are provided. 16 U.S.C. § 1539(a)(2)(B). The Services' regulations largely reflect the statute. *See* 50 C.F.R. § 17.32; 50 C.F.R. § 222.307. The ESA explicitly directs that all ITPs "contain such terms and conditions as the Secretary deems necessary or appropriate." 16 U.S.C. § 1539(a)(2)(B)(v).

All of these provisions for issuance of an ITP would directly and indirectly benefit the conservation of wolverine in the lower 48 States and give the Service the opportunity to require that certain mitigation measures are implemented by the states before authorizing trapping in areas occupied by wolverine. The Service's trapping exemption in the 4(d) rule, however, alleviates the need for an ITP and related habitat conservation plan and, by extension, the agency's ability to require effective mitigation measures (including but not limited to restrictions on all trapping in certain areas important for wolverine conservation). This is a lost opportunity.

Under the ESA, the Service must (and should) take a precautionary approach to protecting threatened and endangered species. *Connor v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1998). For wolverines that means alleviating the threat from otherwise legal activities, like trapping, that have the potential to harm individual wolverines and their habitat. Non-climate stressors, like forest management and trapping (as well as winter recreation, travel planning, transportation corridors), – especially when viewed cumulatively – must be minimized to enhance the resiliency of wolverines to the effects of climate change. As previously mentioned, given the precarious and vulnerable state of wolverine in the lower 48 States, the take of even a single wolverine can cause irrevocable damage.

As mentioned above, take is defined broadly and includes harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or to attempt to engage in any such conduct. 16 U.S.C. § 1532(19). Whether or not a specific project or activity – i.e., a logging project, a trapping regulation, private land development, ski area expansion, winter recreation, travel planning, or predator control actions – results in "take" of wolverine, should be evaluated at the project or activity level, if and when those decisions are made. The Service should not allow blanket assumptions about the impacts of yet-to-be proposed activities and projects to suffice. Exempting potentially harmful activities from the take prohibition in the 4(d) rule is thus premature, unnecessary, and violates the ESA by failing to provide for the conservation of the species.

e. No steps can be taken to "minimize" the potential incidental take of wolverines from traps and snares.

The Service's 4(d) rule exempts trapping for other species in areas occupied by wolverine, provided that trapping is done in accordance with state law and regulations and conducted "in a manner that uses best practices to minimize the potential for capture and mortality of wolverines."

50 C.F.R. § 17.40(2)(vi)(B). But no details about what those "best practices" may be, nor how they will be determined, are provided. Nor, as explained above, is there any scientific support for the notion that baited traps and snares used to catch bobcats, wolves, and other species can be modified in such a way to limit or minimize incidental take of wolverine – a fierce scavenger.

In 2013, the Association of Fish and Wildlife Agencies ("AFWA") published a pamphlet on "How to Avoid Incidental Take of Wolverine During Regulated Trapping." The pamphlet recommends: (1) setting pan tension for wolf traps to at least 10-pounds of pressure to prevent a wolverine from firing a trap set for wolf; (2) using a #2 or smaller foothold trap for other furbearers (except wolf) or consider a rubber-padded foothold trap if a #3 size or larger is used; (3) making marten and fisher sets on leaning poles no larger than 4" in diameter and set at a 45 (or greater) degree angle with trap and bait placed at least four feet above the ground or snow level; (4) not using large-sized body grip traps if wolverine tracks are observed in the vicinity of a set; (5) when using baits larger than 5-pounds, setting traps at least 30-feet from the bait; and (6) to avoid wolverine in snares set for wolf, placing the bottom of the snare loop just below knee cap level (18-21" above the ground or packed snow surface). But none of these recommendations are proven to work and the best available science on wolverines reveals they are unlikely to do much (if any) good in minimizing take of wolverine.

Further, none of these recommendations are included in the states' trapping regulations. Nor are they required because of the way the broad exemption in the 4(d) rule is phrased. Indeed, states like Idaho, Montana, and Wyoming now have broad, unfettered discretion to define what "best practices" to minimize wolverine take are and to include (or not) such practices in their regulations.

(2) The best available science reveals the 4(d) rule's blanket exemption from take for logging projects (to reduce the risk or severity of wildfires) is unnecessary and will undermine (not further) the conservation of wolverines in the lower 48 States.

The Service's 4(d) rule includes a broad exemption from take for all forest management activities designed to reduce the risk for severity of wildfires. 50 C.F.R. § 17.40(2)(vi)(A).

The Service admits that logging and prescribed fires "can modify wolverine habitat" but notes that this "generalist species" appears to be "affected little by changes to the vegetative characteristics of its habitat. 88 Fed. Reg. at 83,768. The Service also explains that most "wolverine breeding habitat" occurs at higher elevations, away from such projects which, therefore, are not considered a threat to the species. There are two problems with this exemption.

First, it is contradictory. If, as the Service notes, logging and prescribed fire projects are not a threat to wolverine, and the species is "little affected" by them, then there is certainly no need to

include the activity in the 4(d) rule itself, i.e., there is allegedly no take of wolverine from logging that needs to be exempted by the rule.

Second, at this stage – and based on what little we know about wolverines and how logging may adversely affect the species' habitat (or the availability of prey species) – it is premature to exempt forest management activities from take and/or make sweeping conclusions regarding impacts from such activities. In other words, the "lack of evidence" that logging does not pose a threat to wolverine does not mean no threat exists.

As the Service previously conceded, very little study has occurred and there is certainly no consensus. Some studies might suggest wolverines are able to "tolerate" logging and prescribed burning. Other studies, however, suggest logging — especially industrial logging in occupied habitat — may be a concern because it adversely impacts prey species.

Ruggerio (2000), for example, noted that wolverines generally scavenge for ungulates along valley bottoms and forage and den in remote, high-elevation areas (citing Hornocker and Hash (1981) and Morgan and Copeland (1998)). As such, if managers wish to provide habitat for wolverines, Ruggerio (2000) explains they could pay particular attention in the planning process for ungulates' winter range, and other aspects of ungulate habitat, in order to assure a consistent supply of carcasses for wolverine to scavenge.

Hornacker and Hash (1981) (FWS-01414) documented wolverine movement and range in Northwest Montana and determined that the availability of food was the primary factor determining movements and range. The authors noted that "food is apparently more available, either as carrion or prey, in the mature or intermediate timber stands preferred as wolverine habitat, especially edge and ecotonal areas around cliffs, slides, blowdowns, basins, swamps, and meadows." The authors explained that cover provided by mature or intermediate timber is also important in habitat selection. Wolverines appeared reluctant to cross openings of any size, such as recent clear cuts or burns. Tracking also revealed that wolverines meandered through timber types, hunting and investigating, but made straight-line movements across large openings. Tracks further indicated they often ran or loped across such openings. The author also found that in the course of snow-tracking wolverines, different individuals often bedded-down in timber types which afforded cover.

Hornacker and Hash (1981) also noted logging may have indirect effects on wolverine: the "use of roads built in logging operations should be strictly regulated, particularly in winter. If higher inaccessible country is adjacent to clear-cut areas, wolverines will separate themselves naturally from human activity in summer. In winter and early spring, however, human access on snowmobiles or all-terrain vehicles could bring about disturbance and conflict, not to mention ease of access for fur trappers."

Ruggerio (2000) likewise noted that wolverines generally avoid areas of human activity and that to limit the threat of human-caused disturbance or mortality, managers could also restrict access to portions of the landscape where wolverines are most likely to occur.

Notably, 94% of the currently occupied wolverine habitat in the lower 48 States is in Federal ownership, with most on National Forest land. So, how National Forest lands in occupied by wolverine habitat are managed is extremely important and requires further study and research. At this point, however, the Service should not make any broad-brush conclusions regarding impacts from logging and forest management and exempt such activity from take in the absence of further analysis.

Instead, the Service should err on the side of caution. The Service should "give the benefit of the doubt to the species." *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988); *accord Defenders of Wildlife v. Babbitt*, 958 F. Supp. 2d 670, 677, 680 (D.D.C. 1997). Doing so is critical to maximize the wolverine's resilience by minimizing non-climate stressors.

(3) The Service must undertake a NEPA analysis before finalizing a 4(d) that exempts trapping and logging from take.

The Service takes the position that undertaking a NEPA analysis – either an EIS, EA, or even a lesser CE – is not required before finalizing the 4(d) rule, presumably because it considers the rule a "listing decision" under section 4(a) of the ESA, 16 U.S.C. § 1533(a). The Service insists this interpretation, which was outlined in a 1983 policy (48 Fed. Reg. at 49,244) was upheld in *Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995) and *Center for Biological Diversity v. U.S. Fish and Wildlife Service*, 2005 WL 2000928 (N. D. Cal. Aug. 19 2005). The agency is incorrect.

NEPA is generally required for all "major Federal actions significantly affecting the quality of the human environment," 42 U.S.C. § 4332(2)(c), and the 1983 policy relied on by the Service only pertains to listing decisions made under Section 4(a) of the ESA (which it defines as listings, delistings, reclassifications, and critical habitat designations). *Douglas County*, for example, involved a Section 4(a) listing decision (critical habitat).

As explained in *In re Polar Bear Endangered Species Act Listing & 4(d) Rule Litig.*, 818 F. Supp. 2d 214, 219 (D.D.C. 2011), while it is undisputed that an exemption from NEPA is necessary and appropriate for listing decisions under Section 4(a), the adoption of special rules under Section 4(d) – which are triggered by, but separate from, listing – are different and are not exempt from NEPA as a matter of law. *Id.* at 219. Here, a NEPA analysis must take a hard look at the direct, indirect, and cumulative impacts that the logging and trapping exemptions would have on the wolverine in the lower 48 States and evaluate any and all reasonable alternatives to the proposed special 4 (d) rule.

(4) The Service must engage in Section 7 consultation before finalizing a 4(d) rule that exempts trapping and logging from take.

The heart of the ESA is Section 7, which directs all federal agencies to consult with the Service to ensure its actions are "not likely to jeopardize the continued existence" of listed species. 16 U.S.C. § 1536(a)(2). To "jeopardize" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02.

When a federal action "may affect" a listed species the agency must formally consult with the Service. 50 C.F.R. § 402.14(a). The Service must then formulate a biological opinion on whether the proposed action is likely to result in jeopardy. *Id.* § 402.14(g). These opinions must use only the best available science, 16 U.S.C. § 1536(a)(2), and take into account the broader "environmental context" for which they are issued. *Appalachian Voices v. U.S. Department of Interior*, 25 F.4th 259, 269 (4th Cir. 2022). When formulating its biological opinion, the Service must review all relevant information provided by the Federal agency or otherwise available and then carefully evaluate four different categories of information: status of the species, the environmental baseline, cumulative effects, and the effects of the action. *Id.* at 270 (citing 50 C.F.R. § 402.14(g)(2), (3)).

Here, the Service never initiated and completed intra-agency consultation (either formal or informal) on the special 4(d) rule and its exemptions from take for trapping and logging. The Service never evaluated how the effects of the action – here, the blanket exemptions from logging and trapping – may adversely affect wolverine and wolverine conservation in the lower 48 States when added to the already dire environmental baseline and cumulative effects. Nor was a biological opinion obtained. This is a major oversight and violation of Section 7 of the ESA.

(5) Trade in wolverine skins should be prohibited.

The Service's 4(d) rule should expressly prohibit all trade in wolverine skins (including captive bred wolverines) in the United States in order to disincentivize all take and help further the conservation of the species. Failing to do so will create a potential "black market" as the allowable trade will provide cover and opportunity for poached and/or incidentally taken animals and there is no way to distinguish the skin of wild wolverine from a captive wolverine (or at least no explanation on the differences is provided).

(6) Wolverine qualify for endangered status (thus alleviating the need for a 4(d) rule).

The best available science, including the climate science cited in the 2013 proposed listing rule and 2023 listing rule and the threats posed by small population size and low genetic diversity, in combination with other secondary threats (including trapping and winter recreation) reveal that wolverine in the lower 48 States likely quality for "endangered" status (for which a special 4(d) rule is not needed).

The term endangered species means any species which is "in danger of extinction throughout all or a significant portion of its range . . . ." 16 U.S.C. § 1532(6); 50 C.F.R. § 424.02(e). Because the ESA does not define the word significant, courts have utilized the dictionary definition which was found to be consistent with the statute's purpose: "a noticeably or measurably large amount." *Defenders of Wildlife v. Kempthorne*, 2006 WL 2844232, *5 (D.D.C. 2006). In *Defenders of Wildlife v. Norton*, 258 F.3d 1136 (9th Cir. 2001), the Ninth Circuit interpreted the phrase to mean that a "species could be extinct throughout a significant portion of its range if there are major geographical areas in which it is no longer viable but once was." *Id.* at 1145. "Those areas need not coincide with national or state political boundaries, although they can." *Id.*

In the final rule, the Service determined that wolverine qualify for listing as a threatened, not endangered, species. According to the Service, there are no threats to wolverine in the lower 48 States *currently* impacting the species at the population (DPS) level. 88 Fed. Reg. at 83,764. The Service notes climate change (and other stressors) are not presently impacting wolverines in the lower 48 States and, as such, wolverines "are not currently in danger of extinction throughout their range" such that they would warrant listing as an endangered species. *Id.*

Instead, the Service determined that the threats are only likely into the foreseeable future (2100) after wolverine habitat is expected to become smaller, more fragmented, and more isolated as a result of climate change and human disturbances. But until then, the Service insists, wolverines do not qualify for endangered status due to the lack of immediacy, severity, and scope of the threats facing wolverine. This finding is incorrect and conflicts with the best available science.

As previously mentioned, according to the Service's own estimates, the total population of wolverine inhabiting the lower 48 States is no more than approximately 250 to 300 individuals. The Service's previous estimate (by state) was as follows: 175 in Montana; 75 in Idaho; 15 in Wyoming; 1 in Colorado; 10 in Washington; 5 in Oregon; and 1 in California. This population estimate was based solely on a personal communication. *See* 78 Fed. Reg. at 7,868.

In other words, there are no peer-reviewed papers or studies estimating the total population of wolverine in the lower 48 States and the 250–300 number is derived primarily from the amount of modeled wolverine habitat that exists (in the absence of field surveys) which, according to the best science, is not the most reliable or appropriate method for predicting wolverine numbers. Squires (2007), for instance, expressly warns against estimating wolverine abundance based on available habitat-assumed densities, without actual field surveys.

This means the total population of wolverine in the lower 48 States – which is the listable entity – could be much smaller, perhaps less than 200 individuals. Or, there could be more. The point is the Service is unsure how many wolverines inhabit the lower 48 States, but either way, the numbers are very low. The best available science also reveals the effective population of wolverine in the lower 48 States is likely roughly 35 (well below the Franklin (1980) and Frankam (2014) estimates for viability). And, as the Service concedes, this lower 48 State population is divided into various partially or completely isolated small subpopulations (e.g., Cascades, Crazy Mountains, mountain ranges in southwestern Montana) and apparently isolated from Canadian populations. This wolverine population also has rates of successful reproduction that are among the lowest known for mammals.

When viewed in this context, wolverines likely qualify as "endangered" in the lower 48 States. Under the International Union for Conservation of Nature's (IUCN's) definitions, for instance, a species is deemed "critically endangered" and facing an extremely high risk of extinction in the wild if the population size estimate is fewer than 250 mature individuals and there is a predicted, continuing decline in the numbers with no subpopulation containing more than 50 mature individuals. *See* IUCN Red List Categories and Criteria at 17–18 (Version 3.1, Second Edition).

Indeed, the Service has concluded that other species warrant listing as endangered based on similar concerns over isolation, small numbers, and low reproductive rates that are currently being experienced by wolverine in the lower 48 States. *See e.g.*, 64 Fed. Reg. 26725, 26732 (May 17, 1999) (finding that small, isolated population of grizzly bears in Cabinet-Yaak ecosystem warrants endangered listing status).

Notably, McKelvey (2011) anticipates a loss of 63% of the wolverine habitat in the lower 48 States by the time-interval centered on year 2085. The Service previously acknowledged that this anticipated loss in habitat "is likely to result in a loss of wolverine numbers that is *greater* than the overall loss of habitat area." 78 Fed. Reg. at 7,876 (emphasis added). This means that greater than 63% of the wolverine we now have in the lower 48 States will likely be gone in the foreseeable future.

Thus, even if one accepts the Service's population estimate of 250–300 individuals and accepts the Service's theory that this small population is not currently endangered, a likely future population of 63% fewer wolverines certainly is in danger of extinction. Moreover, global greenhouse gas emissions have already outstripped the scenarios on which McKelvey (2011)'s projection of 63% reduction in habitat was based. This means the warmest model used by McKelvey (2011) – miroc 3.2 – which projected nearly 90% reduction in habitat by the end of the century, may be the more accurate projection.

Further, as previously noted and as the Service concedes, a substantial number of the estimated 250–300 wolverines in the lower 48 States are likely unsuccessful breeders or non-breeding subadults. That means the effective population size is dangerously low. By definition, the effective population only considers those individual wolverines that are reproductive. For example, if the minimum viable population is 100 individuals but in any year 50 of those individuals are juveniles (pre-reproductive) and 30 individuals are post-reproductive age, then only 20 individuals are contributing genetically to population maintenance and species survival and part of the effective population. Most biologists consider this number – the effective population size – to be the most important number for conservation purposes because it measures the potential for inbreeding and/or population extirpation. Effective population size determines rates of loss of genetic variation, fixation of deleterious alleles and the rate of inbreeding. A small effective population size also shows reductions in population growth and increases the likelihood of extinction.

The best available science (including Schwartz (2009)) currently reveals the effective population of wolverine in the lower 48 States is extremely small, likely less than 50 and well below the number needed for maintenance of genetic diversity. As previously explained by the Service, the "concern with low effective population size was highlighted in a recent analysis which determined that without immigration from other populations at least 400 breeding pairs [of wolverine] would be necessary to sustain the long-term genetic viability of the contiguous U.S. wolverine population." 75 Fed. Reg. at 78,053 (citing Cegelski (2006)). As the Service now recognizes, the current population of wolverine in the lower 48 States is nowhere close to 400 breeding pairs and well below the number needed to sustain genetic viability.

Indeed, within the lower 48 States there are geographic areas that have functionally no wolverine populations at all. The Great Lakes, for instance, which once were in the historic range of the wolverine, now have zero and other areas like Colorado, California, Utah, and parts of Oregon, Washington, and even most of Wyoming have no functional populations (which is what the Service uses to define range). As such, wolverines are not only "endangered" in a significant portion of their range – as that term is defined in the ESA and interpreted by the courts – they are extinct or functionally extinct (not even remotely viable and/or no breeding populations) in a significant portion of their range.

In the listing rule, the Service recognizes the exceptionally small and vulnerable population of wolverine in the lower 48 States (described above) but defends its "threatened" determination on the grounds that the major threat facing wolverine (climate change) is not *currently* occurring or imminent. But this too is incorrect. The threat to wolverines posed by climate change (which will decrease the amount of available habitat and increase fragmentation) in combination with other threats such as mortality from trapping is on-going.

As the Service conceded in the December 14, 2010, warranted-but-precluded finding: "Warming temperatures *are reducing* snow pack in the western North American mountains through a higher proportion of precipitation falling as rain and higher rates of snowmelt during winter . . . This trend is expected to continue with future warming . . . Shifts in the initiation of spring runoff toward earlier dates are also well documented." 75 Fed. Reg. at 78,044 (emphasis added); *see also* Brodie and Post (2010) (correlating decline in snowpack due to climate change with declining wolverine numbers in Canada); U.S. Global Change Research Program (USGCRP), Global Climate Change Impacts in the United States 135 (2009) (Cascade Mountains spring snowpack *has declined* 25% in the last half-century and is projected to continue to decline by up to 40% in the next 30 years).

McKelvey (2011) projected 31% loss of current wolverine habitat in the lower 48 States due to climate warming by the time-interval centered on 2045 will not occur overnight. The loss of habitat has already begun and will continue in the coming years and decades. In the Service's own words: "Based on this information, wolverine habitat in the contiguous United States . . . *is shrinking* and is likely to continue to shrink with increased climate warming." 78 Fed. Reg. at 7,876 (emphasis added). This is consistent with more recent information.

In 2016, for example, wolverine researchers noted possible range contraction and "instability" of some previously documented wolverine populations from a number of mountain ranges within Idaho and Wyoming. FWS-0017566; *see also* FWS-0020979 (noting the same). This includes the Centennial Mountains in Idaho and Montana, the Teton Mountains in Idaho and Wyoming, the Salmon Mountains of Idaho, and the Smoky Mountains of central Idaho. FWS-0017566; FWS-0020979; *see also* FWS-0017564-69.

Further, as mentioned above, actual greenhouse gas emissions are exceeding the worst-case scenarios envisioned by Intergovernmental Panel on Climate Change (IPCC) and used in McKelvey (2011)'s ensemble projections. Thus, not only are the impacts of climate change currently impacting wolverine habitat but these impacts are worse than projected. And there are no meaningful plans to address or reduce the effects of climate change, or change its course over the next 20 years.

Under these circumstances, wolverines are in danger of extinction because current emissions have already committed the planet to significant temperature increases and there is no indication that climate change (the major threat to wolverines in the lower 48 States upon which listing is based) will be abated, let alone reversed. Absent a major change in course, therefore, it is certain to get worse.

In sum, based on the best available science, wolverines in the lower 48 States are extremely vulnerable due to climate change, small total and effective population size and low genetic diversity, and other secondary stressors. This population of likely less than 300 wolverines is not presently viable or sufficiently connected to the Canadian population (no migrants to buttress population – including no female migration) and, as such, is *currently* in danger of extinction throughout a significant portion of its range. Any finding to the contrary conflicts with the best available science and the ESA.

Under the Service's rationale, if you are pushed off a tall building and are falling to certain death, then you are in danger of extinction and would qualify for "endangered" status because you will hit the ground in a matter of seconds. But, if you are pushed out of an airplane at 30,000 feet, you are only "threatened" because it will take a few minutes to hit the ground (i.e., the threat is not imminent). This approach is illogical and inconsistent with the plain language and intent of the ESA. If the species is in trouble and there is no potential or reasonable possibility that the situation for wolverine will improve (i.e., no parachute), then the species is presently in danger of extinction and qualifies as endangered.

Thank you in advance for taking the time to consider the issues and concerns raised in this comment letter.

If you have any questions or wish to discuss any of the issues raised or do not have (and would like to review) any of the papers cited in this notice, please contact me by phone or at the email address below.

Sincerely,

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